THE OPTICAL MAGIC LANTERN JOURNAL AND PHOTOGRAPHIC ENLARGER.

EDITED BY J. HAY TAYLOR.

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Notices.

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NOTICE.

MANY CORRESPONDENTS STILL FORWARD THEIR COMMUNICATIONS TO THE OLD ADDRESS. WILL THEY PLEASE NOTE THAT OUR ADDRESS IS

56, CHANCERY LANE, LONDON, W.C.

Notes.

THE lantern season which is now about to commence, will, from what we can learn, be a very promising one. It is probable that there will be a greater demand than hitherto for single lanterns.

* * *

IT is difficult to realise the brilliancy of a twenty-five million of candle-power light. The illuminating power of the lighthouse at Cape La Hève, near Havre, is said to be of this power; and even this will be put quite in the background when the new lighthouse at Penmarch is completed, for its light is to be of forty-six million candle-power.

* * *

SOME new sets of slides are now being introduced by Messrs. York and Son which are beautiful, instructive, and amusing. These consist of sets of Chicago, Vienna, Ceylon, Canary, and Madiera, &c., and also some half-a-dozen sets of life models. The comic element is also catered for in a variety of subjects.

* * *

MANY lantern operators have doubtless found it a somewhat difficult task to get their limes freed from the loose lime which invariably gets packed so tightly in the hole as to make one question whether the hole had been bored or not. When in conversation with Mr. F. Brown we learned that it was his intention to supply jets when desired with an arrow-headed lime pin so that the lime may be merely held at the end of the pin and the knob of the lime turner slightly twisted, when, by reason of its action as a drill the hole in the lime will be at once freed. We think that all pin-jets might with advantage be made in this manner.

* * *

MR. WALTER TYLER anticipates a brisk season, and for several weeks past has been re-arranging and adding to the shelving capacity of his establishment in Waterloo-road. He will also bring out a number of novelties about which we may have something to say later on.

* * *

COMMENCING with our next issue, a series of articles will be given by Mr. C. E. Rendle, on "The Construction of the Bi-unial Lantern." These articles will be of special interest to our amateur readers, and will be copiously illustrated from photos. of the various parts of the work under discussion. Mr. Rendle has great mechanical skill, and also possesses the ability of making his meaning clear when writing, consequently these articles will prove of great interest.

* * *

ONE of the finest effect slides that we have seen in connection with showing a tower illuminated with the electric light has just been brought out by Messrs. W. R. Hill and Son, in connection with a slide of Liberty Statue, New York. The slide representing the light is of a mechanical nature, the movement of which is somewhat akin to that of a chromotrope. The light has thus a greater appearance of brilliancy imparted to it by reason of the peculiar movement which is given to the rays which have a very natural effect, quite eclipsing the ordinary style of slide used to produce the illuminated effect.

* * *

A QUEENSLAND correspondent whose letter will be found on another page states that the lantern as a form of entertainment is looked down upon in the Colony, chiefly through the inferior quality or class of entertainment given by many of the travelling lanternists of days gone by. Here is an opportunity for those with good apparatus, subjects and pictures, not forgetting business qualifications, to bring about a change in that part of the world.

* * *

ON reference to the new catalogue of G. W. Wilson and Company, Limited, it will be found that this firm have put upon the market this season a great number of interesting sets. Among them will be found slides of Norway, Italy, Malta, a complete set of English Cathedrals, &c. In fact the reader will find several hundreds of new subjects.

* * *

WE observe that a leading article, "Transparency making for the lantern," which appears in *The American Journal of Photography*, for August is an exact copy of that which appeared in THE OPTICAL MAGIC LANTERN JOURNAL for April, '93. We presume it was the intention of our American confrère to acknowledge the source from which he obtained this interesting article, but that he overlooked it in the excitement of the Chicago Convention.

* * *

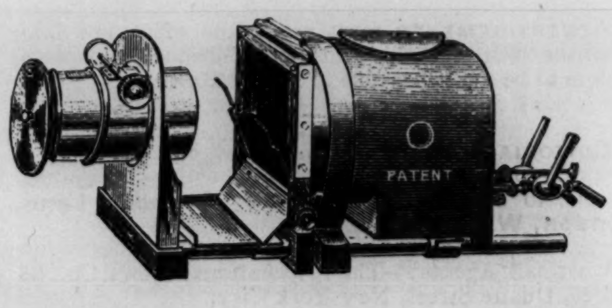
As will be seen in another part of this Journal, Anderton's lantern for producing stereoscopic effects upon the screen, is now upon the market. The necessary attachments can be obtained separately and applied to any bi-unial lantern. We understand that the inventor has agreed to exhibit the apparatus in action at the conversazione of the British Association at Nottingham on the 14th inst.

* * *

SIX of Horner's well-known "Penny Stories for the People," have been illustrated as lantern slides from life models, by Mr. Chatham Pexton. Each set has different individuals to serve as models.

* * *

A lantern possessing high efficiency and great portability has just been introduced by Mr. Lambert Matthews, particulars of which will be found on our advertising pages. The cut herewith shown will give a good idea of the general appearance of the lantern, but there are many important modifications in the arrangement and movement of parts of which a full description can be obtained on application to the patentee. The apparatus when packed occupies the small space of 11 by 6 by 5 inches.



A Walking Skeleton Slide.

At the time we gave the description of the slide of Cupid, we stated that we would next give particulars of the above slide. This slide, like the former, is the property of Mr. Hill, by whom it was designed; it was used at the Royal Polytechnic, and has never before been explained.

It is a very effective slide, but to see it in the correct style, the lantern requires to be slightly drawn further from the screen at the time each step is taken, this gives the effect of its advancing towards the audience.

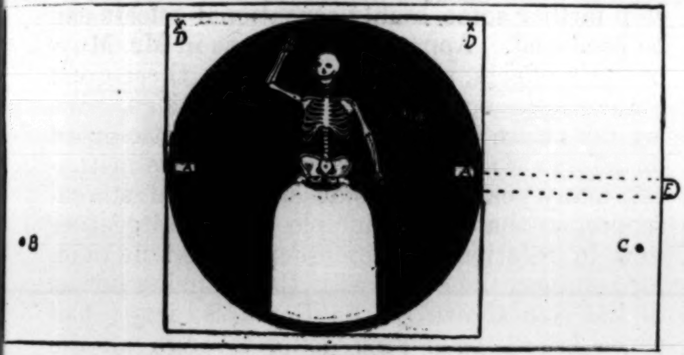


Fig. 1.

Like the previous sketch, this one is also drawn in exact proportions, so that there need be little trouble experienced in making it. The upper portion of a skeleton having been drawn as shown in Fig. 1, the glass beyond the figure should be rendered opaque by varnish for the purpose, leaving the lower portion of the glass clear, so as to allow of the manipulation of the legs. To the edge of this circular glass should be fastened a lever, E, so that a slightly rocking movement may be imparted to the glass when this lever is moved.

After this has been fastened in the wooden frame, a piece of glass of the relative size and shape of Fig. 2 should be cut and rendered opaque at the parts shown. This then is firmly secured in the frame with pins, close to, but not touching the circular glass. Next cut two pieces of glass as in Fig. 3, and cement to the edges a couple of stout pieces of cardboard, at the ends of which bore holes, B and C.

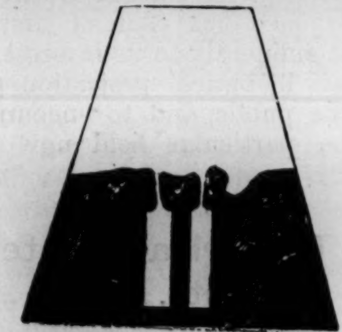


Fig. 2.

The legs having been sketched and the remaining parts of the glass obscured, the slide is completed with the exception of a couple of stops, which may be formed of a few thicknesses of cardboard cemented on the circular glass (Fig. 1), at A.A., after which the two parts of Fig. 3 are secured by screws on the frame at the places indicated.

When the lever D is slightly depressed, the body portion of the figure will incline towards the right, and, in doing so, the stop A will cause the glass of Fig. 3 to be depressed, making the corresponding leg to increase in length, which gives it the appearance of taking a step forward. When the lever E is returned to its normal position, the glass on which the leg is sketched (being connected to D by an elastic band) also goes back to its original position. In this manner, by moving the lever up and down, the body slightly oscillates, and each leg in turn becomes elongated and then returns to its previous position; thus giving a very natural appearance of walking forward.

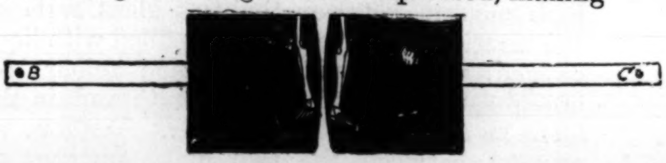


Fig. 3.

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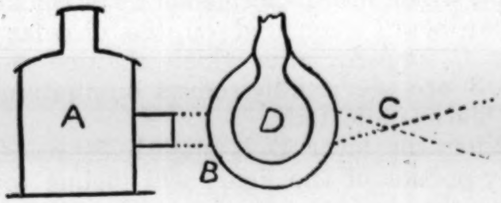
Sensational Curiosities in Optical Projection.

During the last session of the scientific societies of this country, two demonstrations in optical projection attracted considerable attention. One of them was exhibited for the first time in the history of the world at the Royal Institution, and has not been seen since, for the expense thereof is great.

Professor Tyndall, in times past, has sometimes at the Royal Institution, in the course of experiments on the absorption and transmission of heat, taken a beam of light from the electric-lantern, passed it through a trough of water with parallel glass sides, then brought it to a focus by means of a lens of ice, and with the concentrated rays thus passed through ice has fired gunpowder and other substances. During the last session Professor Dewar performed a still more remarkable experiment; his lens for condensing the rays was not of ice but of liquid oxygen, so cold that when absolute alcohol is dropped into the liquid it freezes, and the solid drops rattle inside the liquid like marbles whenever the containing vessel is shaken. The plan he adopted is represented in the accompanying cut, in which diagram A is the electric lantern, B a double glass vessel, with an excessively high vacuum between the two glass surfaces; the interior of the vessel D was filled with liquid oxygen, which liquid has a blue colour; this brought the rays to a focus at C, and in that focus he set fire to brown paper. Without the vacuum between the two glass surfaces the outside of the vessel would have been covered with hoar frost from the condensed aqueous vapour of the air of the theatre. An ordinary vacuum, so-called, is useless for the purpose. The vacuum he employed was much higher than that used in radiometers, and contained no trace of vapour of mercury.



The great kindness of Professor Dewar in selecting brown paper for combustion will be noticed. Lord Rayleigh once did the same thing in the same place, by selecting burning brown paper to mark the track of a beam of light. He explained that when he was alone he used tobacco smoke for the purpose, but as some in the auditory might object to tobacco, he publicly burnt brown paper instead.

The other feat in optical projection which attracted much attention was exhibited at one of the conversaziones of the Royal Society at Burlington House. It was Mr. Anderton's method, already described in these pages, of obtaining stereoscopic effect in optical projection by means of polarised light and suitable appliances. A subsequent public criticism suggested that some of the illusion of this was spoiled by the surroundings of the screen being those of an ordinary hall, which detracted from the suggestion of reality, and that the effect might be enhanced if the screen were seen through a kind of dark tunnel. The inventor, by his utterances, seemed to think that this point was directed against his invention in particular. It was, however, merely a suggestion for the improvement of all kinds of spectacular optical projections. Delicate little points like this receive the attention of the French, with their highly developed artistic perceptions, which is why Daguerre, when he was exhibiting his diorama in Paris, produced all the effects at the end of a short black tunnel between the screen and the spectators. When he represented the mountain sliding down into the valley of Arth Goldau, the illusion would have been far less had there been a statue of Cupid, or any other adornment of a theatrical building, close to the edge of the screen.

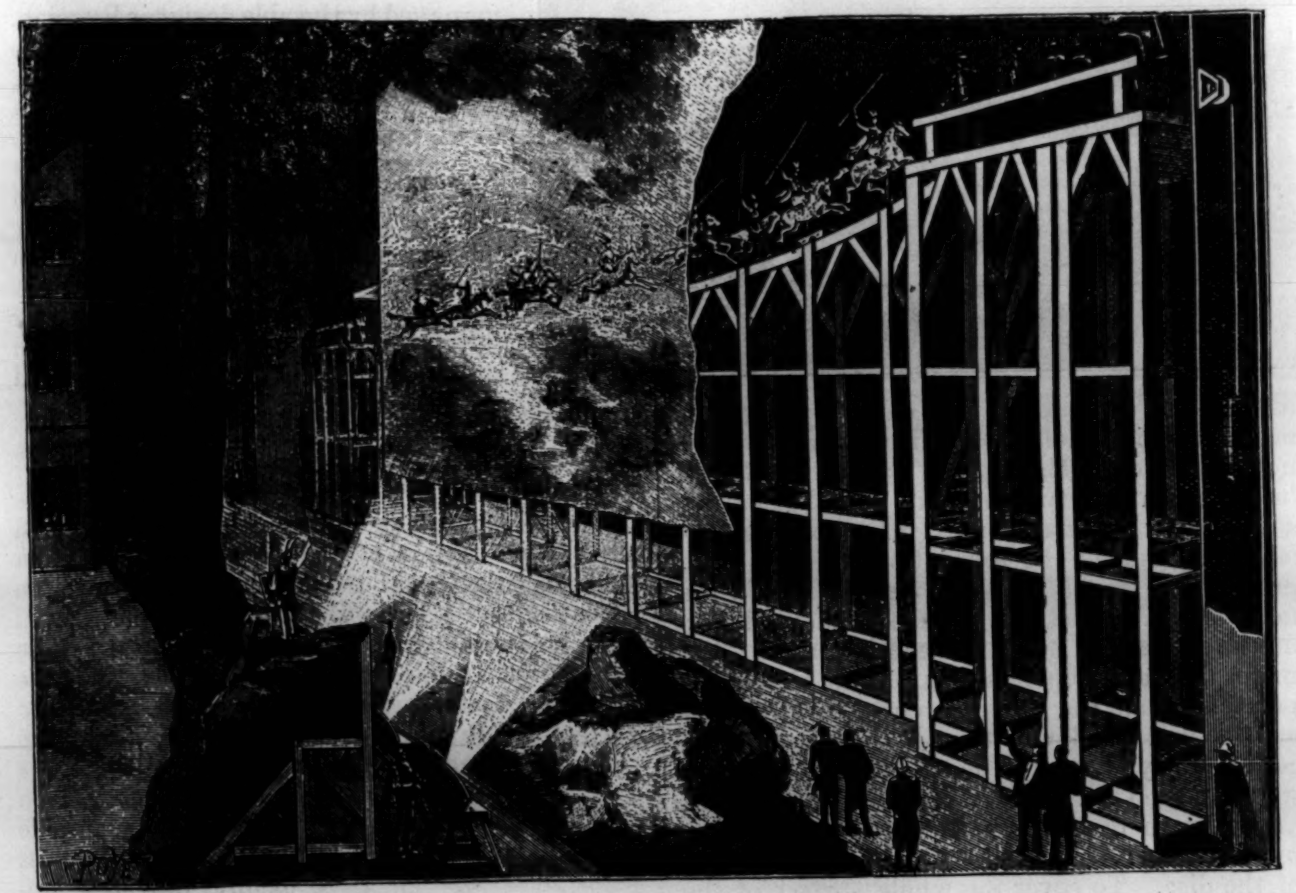
The arrangement of Mr. Anderton seems to be, perhaps, the best which has yet been presented to the public for exhibiting stereoscopic effects on a large scale, and by pushing it one step farther some highly sensational effects can be produced. Apparent motion, as in Mr. Muybridge's effects, should be given to these great stereoscopic spectacular demonstrations. We are not aware that this has ever been attempted on a large scale, but it was done in rare instances many years ago inside small hand stereoscopes, so that the principle is not altogether new in relation to stereoscopy. Let us take, for instance, the scene with the prancing horses of life size shown at the Royal Society; had those horses been seen going through all the movements of prancing in front of the spectators, it is easy to see what an effect it would have had on the imaginations of the observers. To achieve the result just stated seems to necessitate but the exercise of a little inventive ingenuity, and going to some expense in the first cost of apparatus. Farther off in the future, inventive skill may possibly present us with real instead of virtual optical images in the air, in connection with these demonstrations, but that time is not yet, for practical attainment always follows slowly, and step by step, upon the heels of scientific ideas.

The Crystal Palace Company has plenty of space before and behind screens for the production of new and old feats in optical projection, nor does it object to public attractions involving scarcely any expense but that of first cost. Would it not be eminently to its interest to try to bring new feats in optical projection prominently before the public, and to encourage all inventors in the particular field now under notice?

——:o:——

Striking Theatrical Lantern Effects.

Now that the position of the lantern has so greatly changed for the better as a powerful educational instrument, a desire probably exists among the members of the rising generation to see also what the lantern can do as a means of amusement as described in the records of the past, and how far those ancient means can be improved to meet present-day requirements. For instance, the phantasmagoria effects common in the past are now rarely seen, and from lantern pictures all the glory of artistic colouring has now departed, for it would not "pay" a skilled Italian or French artist to put his talent and genius into slides to be sold at a shilling or two each. A revival in this matter would, perhaps, be remunerative, although in the first instance it may have to gain its clients chiefly among the wealthy, or among those caterers for the public who have to deal with large auditories. For instance, it might suit the Crystal Palace Company or Mr. Henry Irving to see what can be done in the matter, as the outlay will be chiefly but in first cost, and not so much in the running of an entertainment for several weeks or even months.



The French seem to have just seized some such ideas, for *La Nature* describes in detail, with engravings which we reproduce herewith, some grand lantern effects displayed nightly at the Opera Theatre at Paris. One of the engravings shows how the effects are produced, the other how they appear to the spectators in front. Among the detached pieces of Richard Wagner's works often given at Parisian concerts, is the "Gallop past of the Walkyries," much beloved by musical amateurs; it is a magnificent symphony, describing the superb and warlike daughters of Wotan traversing space. To represent this well in a theatre demands special art, for while the musician excites the imagination of those present, it would never do to spoil the impression by a bad representation; it would be as bad as spoiling delicate newspaper engravings by inferior machining. At the same time it is not easy to represent a number of ghostly amazons traversing clouds on horseback.

At Brussels, where this work of Wagner was represented some time ago, pasteboard pictures were made to cross the scene, and with a piteous effect.

The directors of the Opera of Paris placed the representation of this scene in much abler hands, those of M. Lapissida, who shows us living people traversing the clouds in the midst of a tempest. The scene represents a savage site strewn with rocks, and clouds are driving along the horizon. This effect is produced by means already known in the theatrical world, but not often employed; the clouds are painted on glass slides, and by the aid of an electrical or limelight lantern are made to traverse the scene. Of course, in a world-renowned theatre like the Paris Opera, considering also its large dimensions, the use of an electric lantern is necessary; in smaller establishments the limelight would do. This sailing past of the clouds has to go on for half an hour, and that causes a difficulty; it would never do to push in different long slides, the separation between each producing a travelling black vertical line in the heavens. The method, therefore, adopted is to use large discs of glass, 60 centimetres in diameter, mounted upon an axis; the clouds are painted round the circumference, consequently as the disc is slowly turned the clouds pass continuously across the background; they would go on for a year if necessary without any solution of continuity; they seem to move in a straight line because of the great diameter of the disc. To cover the whole surface of the background several such lanterns are arranged; they are hidden from the spectators by the foreground representing rocks. The background, which the larger engraving shows in part, is of *tulle* painted blue; it is exceedingly transparent, but this transparency is not utilised for the lantern projections, the lanterns being in front. Behind this translucent blue screen is absolute darkness, hiding an immense scaffolding, nine metres high on one side, and six metres high on the other—say nine yards and six yards high, English measure, which is near enough; the scaffolding is thirty metres long, the whole width of the background. Along this "practicable" high road glide wooden horses, drawn by a cable attached to a heavy counterpoise, and thereby made to move behind the scene whenever desired. At each of such moments a brilliant flash of light from an electric lantern —with the beam of light parallel to the translucent screen hanging between the riders and the spectators—is made to fall upon the spectral horsewomen, who then are seen traversing the clouds by the spectators in front; they also seem to be riding in space. The illusion is perfect.

This act terminates with a fire, managed by the able designer Ruggieri. Great flames course along the rocks and burst everywhere from the soil, accompanied by thick smoke tinted a lurid red by means of Bengal fire. The flames are partly produced by tufts of guncotton placed before hand among the rocks, and lighted by hidden assistants, and partly by men furnished with long pipes of white iron projecting lycopodium powder through holes made in the floor of the stage. Every care is taken to guard against accidents from fire.

—:o:—

A Few Forms of Saturators.

Since we last spoke of Saturators, we have had several left at our office. We shall first give a short description of three forms, which are the invention of Mr. Timberlake, the well-known cycle manufacturer, of Maidenhead. All these forms give an excellent light, although it is the opinion of this inventor that neither are so perfect as to make him at present enter into the matter commercially. Of the three we look upon fig. 1 in the most favourable light, for as it goes bodily into the lantern it is kept sufficiently warm to ensure a good light with little trouble. The

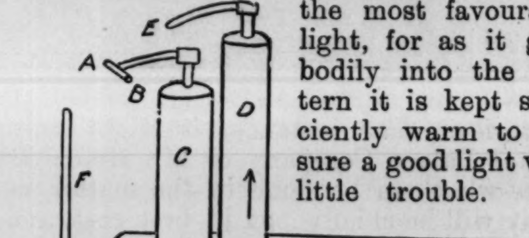


Fig. 1.

base is divided into two compartments G and H, which are, however, connected at one end as shown. These compartments, together with the upright tubes C and D, are stuffed after the usual manner of saturators; the jet is fastened on the pin F, and the oxygen side of the burner connected with the B end of the T piece, that at A being connected to the gas supply, whilst the tube E is connected with the hydrogen or saturated side of jet. The length of tubing through which the oxygen passes, and during which time it is being saturated, is thus about two feet.

Fig. 2 is not unlike in principle to the form of saturator introduced by the late Mr. Scott.

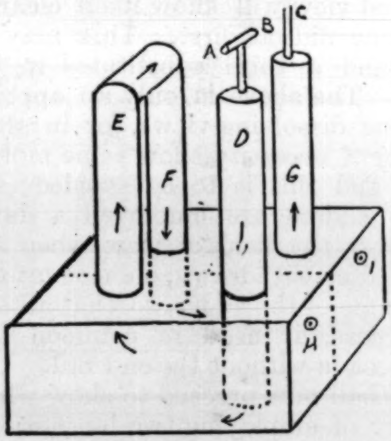


Fig. 2.

Like it, it has to be fastened or suspended at the back of the lantern, and is kept warm by means of a small oil lamp fastened to the casement which surrounds the upper portion, but which is not shown in the cut, as it is merely set on to act as a warm-air chamber. Mr. Timberlake has, however, made a modification of this form which, like fig. 1, heats itself in the lantern. It will be seen that the reservoir which form the base is divided into two compartments, and stuffing is introduced into the four tubes, and also the reservoir, so that the gas will travel down D, then along the reservoir, then up the tube E, thence across to F, down which it goes and finally comes up the tube G. The connection is made to the hydrogen side of the jet at C, the oxygen side from B of the T piece, whilst the tubing from the gas bottle is secured to A.

Another of the same class is shown at Fig. 3. It consists of what may be termed two cans, one within the other. In the inner one, saucer-shaped ledges E are secured at the sides with packing between. These saucers have a series of semi-circles cut out of them after the style shown at G. Owing to the peculiar shape of the ledges, the saturating fluid will have a tendency to keep to the sides at which point only the oxygen can pass from ledge to ledge. Heat from a small lamp is applied to the bottom of the apparatus, the hot air circulating in the space DD.

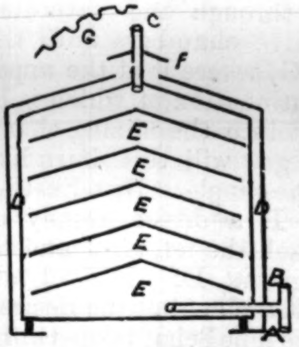


Fig. 3.

The tube attachments are made in the same manner as the foregoing saturators, viz., bottle to A. B to oxygen side of jet, and C to hydrogen side. The hot air finds an exit at F, above which there is a small shield which protects the rubber tubing.

Mr. Timberlake writes that as soon as the cycling season is nearer completion he will favour our readers with an account of his saturator experiences, which range over a number of years; and will also give an account of a number of other forms of saturators which he has devised and used. This cannot fail to be of interest.

We have recently tried a very neat and ornate saturator, which we believe it is the intention of the inventor to place upon the market shortly. It (Fig. 4) looks not unlike a model of an engine. It is only 5½ inches high, 8 inches long, and 4 inches wide. In the interior of the reservoir M there are two or more concentric rings, each forming a separate passage for the

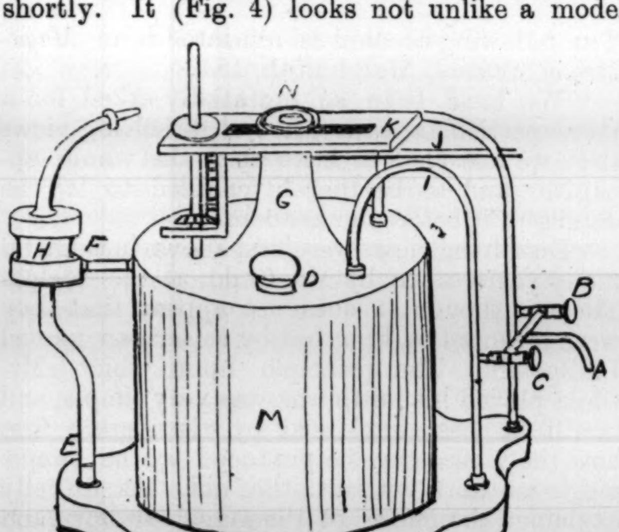


Fig. 4.

gas which circulates as follows: The supply from the bottle is attached to A, and branches at once in two directions. After passing the screw-down tap C on the left, the oxygen goes up the pipe I, and thence into the outside ring of M, the tube lying along the upper part in the form of a perforated ring. From these perforations the gas passes through the saturated material in the respective chambers until the gas reaches the dome G, where it at the upper end enters a tube, a continuation of which is F, whence it finds its way into the mixing chamber H. The saturated gas will then burn like ordinary house gas at the nipple. By adjusting the screw-down valve B a direct supply of oxygen is allowed to reach the jet, *via* J and E. The saturator is charged at D. The adjustments of the lime gear K are held at the desired position by the nut K, the lime being turned at L.

At the time of our going to press we were unable to ascertain (owing to the inventor having gone for his holidays) the name of the firm who are to introduce this apparatus, and also to get definite particulars regarding the price, but we hope to have something more to say about it after we have submitted it to a few tests. We understand that the trade name of this apparatus is to be the Gridiron Saturator.

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Dissolving Views in the early Days.

THE following account is reprinted from *Magazine of Science*, March 25th, 1843.

"We have been so repeatedly asked for a more particular description of dissolving views that we are glad to have seen the whole apparatus and to be thereby enabled to lay the details of it before our readers.

"Dissolving views were first shown in England many years since by Mr. Child, at the Adelphi Theatre, though it does not appear that they were invented by him, but by a German named Philipstall. The principle upon which Mr. Child played his lanthorns was very simple, and it will be best explained by considering first how the views may be produced by the simple magic lanthorn without other aid. As we fully explained the nature of the magic lanthorn and phantasmagoria before, it will not be necessary to enter at present into the consideration of that instrument, but we will suppose that our readers are acquainted with its structure and the manner of playing it upon ordinary occasions.

"A transparent screen being between the spectators and the operator ready to receive the images, and the lanthorn being lighted and fixed upon a table at any convenient distance behind the screen, according to the size that the pictures are required to be, we will suppose that a slider with a view upon it is placed in the lanthorn. By properly adjusting the focus, the view will appear clear and bright upon the screen, as is well known. Now by shifting the position of the first lens the lanthorn is thrown out of focus, and consequently the view becomes obscure. When at its greatest degree of obscurity, a second slider is to be slipped in over the first, and the confusion is rendered therefore more complete. When the second view is in its place, withdraw the first, and then gradually bring the lens up again to focus, when the second view will show itself clearly, as the former one did at first. This may be withdrawn, and a third substituted in the same manner. The above is only an approximation to the true dissolving views, for in altering the focus you of necessity show some motion in the scenery, and this is to be avoided; and if the common sliders are employed a dark line is seen across the field of view when a slider is introduced or withdrawn, on account of the end of the frame of the slider, so that all sliders for this purpose, if used in common lanthorns, must be made without the end rail.

"We shall now proceed to show what will be the effect of employing two lanthorns, for it is with two, or in moving scenes with three or even four lanthorns that the true and best effect is produced. In addition to the magic lanthorns alluded to in the last experiments, let us place beside it another lanthorn of equal power and focus, and adjust both to the proper size of the field of view on the screen. Now put a slider in each, the co-mixture of the two will produce a mass of obscurity and confusion; and if you stand behind the lanthorns and place your hand over the nozzle of one of them, the view from the other will be clear and well defined. Gradually withdraw your hand from before the lanthorn, and place the other hand as gradually before the nozzle of the second, and the view will evidently be altered. Mr. Child used to have a little flap of tin in the front of each lanthorn, to shut off the light alternately from one to the other. This is the whole art and mystery of the dissolving views; and at the Adelaide Gallery and Polytechnic Institution the only reason the views are of a superior character to those we may be able to produce at home with our own common apparatus is that the lanthorns and the sliders are of a large size, glassed with the best glasses, so as to avoid achromatic refraction, and illuminated with the brilliant light produced by the oxy-hydrogen gases thrown upon a cylinder of lime.

"The following is a description of the whole apparatus used at the Polytechnic Institution, where these views are exhibited in the greatest beauty and perfection, the screen upon which they are shown presenting a surface of 648 square feet. And our readers will observe that while the views of Mr. Child were through a transparent screen from behind, at the Polytechnic they are thrown upon a screen, the lanthorns being on the same side of the screen as the audience; not that it makes much difference in their brilliancy, but it was necessary to explain this lest a discrepancy should be observed in the following account compared to what we have already stated:—Instead of two distinct lanthorns, there is employed in this Institution a single lanthorn with two nozzles and sets of lenses, also two lights are placed withinside.

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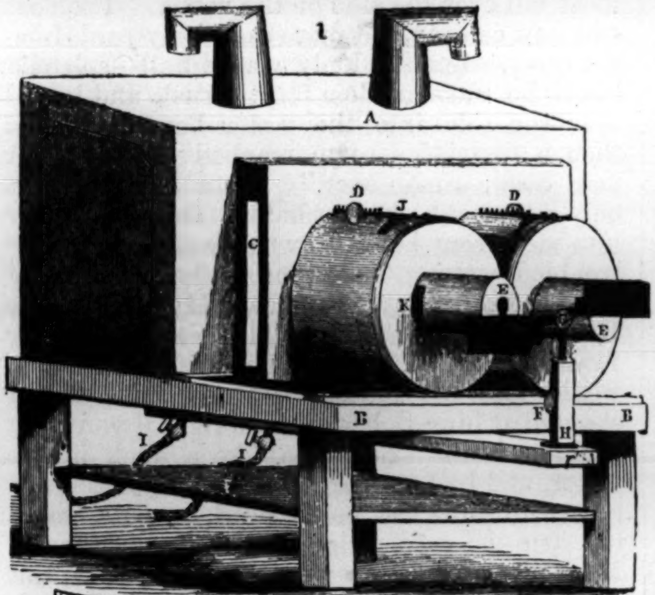

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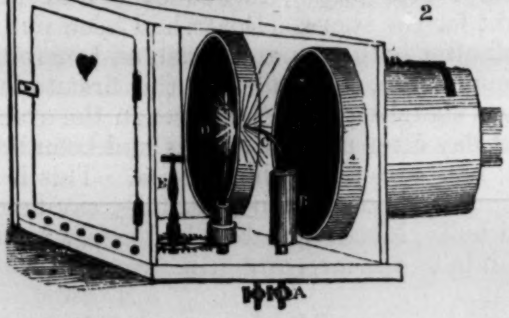

"Fig 1 shows the outward form of the whole. A is the box, B B the table on which it stands, C the hole into which the sliders are placed, or they may be inserted in a hole cut at K, there being a double convex lens between C and K, about opposite to the letter J. This is capable of adjustment by the thumb screws D and D. E E is the nose of each lanthorn, G is a fly of tin which, being turned round, obscures and shuts off the light of one lanthorn while it displays that of the other. It is made to slide up and down by means of the nut F, and is put nearer or farther from the lanthorn by the sliding piece H.

"A peculiarity as to shutting off the light is here to be observed. There should evidently always be upon the screen as much light as is thrown by one lanthorn, and in shutting off the light the upper part of one lens should be displayed, while the upper part of the other lens is obscured, otherwise in the last case, at each change one part of the field of view would be darker than the other, and if the dissolver or fan did not exactly admit as much light as it obscured, the field of view would fluctuate in its brilliancy. Both these requirements are fully accomplished by the fan here shown.

"The arms are, however, movable, because in some cases it is required to use two lanthorns at once, as in several of the moving scenes, where a boat, or a bird, a mill, etc., is seen to be in motion. This is done, generally speaking, by the second lanthorn, only a little of its light being admitted; thus if a boat sailing were to be thrown across the previous view, the boat would be painted on a slide and surrounded with black, so that no more light should be allowed to pass from the lanthorns than passes through the lines of the boat itself, and this is too small in quantity to effect the general brilliancy. In this manner Mr. Child produced two beautiful moving scenes, Summer and Winter. In the latter a snowstorm was seen with great truth of delineation. The wintry view was cast from one of the lanthorns, the snow was represented by making minute specks of light upon a glass painted black. This was drawn through a second lanthorn, not sideways as upon ordinary occasions, but drawn upwards from the bottom, and as in all these experiments the motion of objects is reversed, the snow, represented by the light passing through the white specks, appeared to fall.

"Fig. 2 shows the structure of the limelight, and it will be seen to be exactly like that already explained, when considering the oxy-hydrogen microscope. At A are two pipes admitting the gases. In the receiver B they are mixed, they then pass in a mixed state through the blowpipe C., and, being ignited, strike against the lime cylinder D, producing the required light. E is a key connected with a wheel, which works in a pinion beneath the lime cylinder, for the purpose of turning it round that a new surface may every now and then be presented to the flame. The distance of the lime cylinder from the condensers or the lenses which are nearest to them is about eight inches, and in order that the slider may not be cracked, or the painting pealed off by the heat, a plain piece of glass is attached to the painted side of the slider. In Fig. 1, 11 shows the position of the pipes which convey the gases.

"The lime cylinder, which may be used for all purposes of this kind, are about 1½ inches long and ¾ inch in diameter, with a hole through them. To make them, we may procure a piece of chalk, marble or limestone, and cut it to a proper shape and size. Put several of these in a crucible, and keep them red hot in a fire for three or four hours. They should afterwards be kept in stoppered bottles till wanted for use, those of chalk are to be preferred."

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A Lanternist's Diary.

By Ad-amicos.

It was on a beautiful September morning in '75 that Thompson, Bob, and myself stood on the departure quay at Greenock—held a brief conference as to whether we should walk or take steamer to Gourock—and it was decided that Bob should wait and go on by boat with the luggage, while Thompson and I did the journey on "Shanks's pony." We afterwards had cause to regret that this arrangement had been adopted, as the following incident will show.

The distance to the "Clachan" named was but four miles, if I remember rightly, just sufficient to stretch the legs abit, whilst the blow along the coast would clear the lungs and drive out the cobwebs. We got to Gourock quite an hour before the boat was due, and spent the time in watching the blasting operations that were going on in a stone quarry close by.

Gourock Bay is such an one that you read of in books, or descriptive writings. As near as possible a true semi-circle, and which, on the morning referred to, was studded with craft, chiefly of the pleasure type. What would we not have given for a "Kodak," or for the matter of that any one of the perfect hand cameras of present-day repute. Standing on the sea front we could just discern a thin cloud of smoke rounding the point to our right. By this we knew it was time to make for the pier, or quay as it is more generally called. "Boat looks pretty full," I remarked to an official as we stood on that anything but handsome structure. "Ah, she is full, sir, this morning, near a hundred head of cattle aboard, and they're troublesome at times." "I am sorry to hear that," I returned, "for my man's coming on from Greenock with some gas-bags and baggage; I hope nothing will happen to them." "Don't fear, sir, your man's up to his work, and will be looked after; I saw you all a week back further doon the water." The words had scarcely left his lips before Thompson, mad with excitement, shouted at the top of his voice, "God's! a general fight on board." It was too true, a wretched panic had somehow occurred; it looked as though a score or so of bullocks must fall over the side of the vessel. The boat was now close in, not more than forty yards from the quay, when suddenly a huge bull—splendid beast, he was—made a frantic rush and leaped over the side into the water beneath. Just then a frenzied scream reached our ears, "A man over; a man over." For a moment—but only a moment—he was hidden, and as he came into view from beneath, what was by this time troubled waters, Thompson yelled as I never hope to hear man yell again, "My God, its our Bob," and it was. It would be absurd to say I was not excited, but poor Thompson, I thought, would lose his reason. "Don't be a fool I shouted at him, Bob will be all right if you don't frighten him." Bob was like a duck in the water, and had no fear. For a few seconds he turned towards the pier's head, saw us, waved his arm in recognition, laughed (as though, Mark Tapley like, he were saying, "Now, this is what I call jolly"), turned over and made straight for the shore. Boats had been put out to look after both man and beast, and incredible as it may seem, the bull was the first to land, and was slaughtered in the street in the evening of that day after many attempts had been made to get him into a slaughter-house. This is the only time the writer can truthfully say he saw a mad bull. Meanwhile Bob had safely landed, and didn't appear any the worse for his ducking.

There is generally some good side to look upon in accident or adventure, and I remember at the time the above incident happened we concluded that had it been winter instead of the summer's fall, our friend and comrade must have lost his life, for we had frequently seen the sea wash over the quay, completely hiding it from view.

London, December 25th, '78, black fog the whole day; Gray had a long sleep.

"Now, look here old chap," said Gray, a day or two before the 25th, "you are giving a lantern show to the youngsters at the 'Cringle Orphanage' on Christmas night. I am anxious to be posted up in the work, and as this is a good opportunity, I propose you come up to my chambers in Great James Street on Christmas Eve and stay two or three days. We can have a good rehearsal, can each go to our respective family circles for the beef and pudding part, and meet again at night."

So I agreed to his request. Had a good time of it at his comfortable diggings on the 24th, and as he was to act as operator at the lantern on the next night, put him through his facings as best I could. As we rose to retire for the night we notice the room appeared filled with a vapour, and discovered on approaching the window that a dense black fog had arisen. We shivered simultaneously, and concluded that just another pipe and a night-cap of toddy was the best preventative against swallowing fog.

Christmas morning, 8 o'clock; the maid apprized us that "breakfast was a-waiting."

Gray said he did "not feel like getting up," so if I would excuse him he would have a lay in, as his people did not expect him until 2 o'clock. It was arranged to meet again in the evening at half-past six at the "Cringle Orphanage."

The evening came, so did half-past six, but no Gray. "He'll come in presently," I said to myself, "all in a bustle;" but he didn't. "Another five minutes and I must begin, for it's against my rule to keep the people waiting." Up went the roller curtain, still no Gray. The orphan children screamed with delight at the pictures till they were hoarse; still no Gray. The curtain fell on the last scene, the show was over; but he came not. I naturally concluded his friends had persuaded him to remain with them, and, as he knew his presence was not imperative at Cringle, had consented.

It was 12 o'clock when I reached Great James Street. "Mr. Gray upstairs, Ann?" this to the maid as she let me in. "I think he is, sir; I am not quite sure, will you go up." I entered the drawing-room; all was dark; lighted the gas, opened the bedroom door, and called, "Will! Will! are you there?" "Halloo!" I heard the bedclothes being thrown about, and in less time than it takes to write it, Gray appeared at the door in his dressing-gown. "What the devil's the matter! what's the time?" he said, yawning all the while he spoke.

"Past twelve," I replied.

It was sometime before I could make him understand that it was 12 o'clock at night, and not mid-day. He had not been up, or out, or anywhere; had awakened two or three times he said, and finding daylight had not arrived, still went on with his sleep.

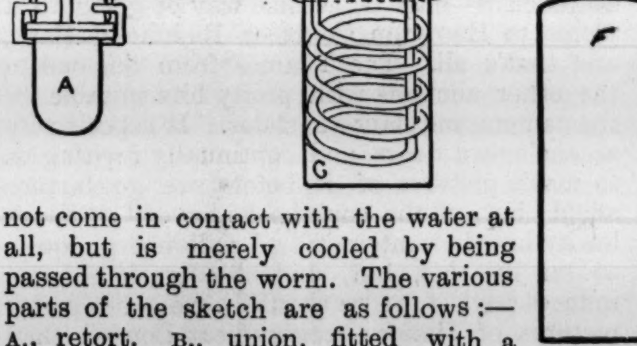
Compressing Oxygen at Home.

By J. Rumsey (Sydney).

In this journal for last January, an article appeared on the above subject, giving particulars whereby oxygen might be compressed to a certain extent without employing apparatus of an elaborate or expensive kind. With the aid of the drawing given on page two, the process appeared very simple, but the question that was likely to at once occur is, is it a perfectly safe process? It is now over two years since I proposed to certain persons in this part of the world a similar process, but was deterred from carrying it into effect on the advice of several scientific friends, who after carefully going into the particulars pronounced it unsafe. The principal part in which there was any chance of danger, was the chance (slight it is true) of water being blown back into the retort; for, although there was a perfect check against any water being forced into the cylinder, there was none whatever to prevent the water being, by any means, sucked back into the retort. Not, perhaps, that there was any great chance of this, but should it occur, the effects would be most disastrous.

In subsequent experiments, I decided to dispense with the washing bottle altogether, and substitute a cooler instead. This cooler takes the form of a worm, through which the gas passes, and which is immersed in water, the water being continually changed so as to ensure it being cool.

This arrangement will be seen in the accompanying sketch. The gas, it will be seen, does not come in contact with the water at all, but is merely cooled by being passed through the worm. The various parts of the sketch are as follows:—A., retort. B., union, fitted with a piece of wire gauze. C., cooler. D., air tap. E., valve. F., cylinder. G., gauge. H., safety valve, loaded to eighty pounds.



The solution in any cooler or washer is for the purpose of taking away the chlorine, and it does do so. On the other hand, the quantity of chlorine is so very slight that it will have no action on the metal of the cylinder, unless left for a very long time. When charging a cylinder by this method, the gas is intended for use within reasonable time, and no injurious effects will be found, as would be the case if a gas bag were employed. The cylinders I use hold about a foot and a half at normal pressure, so that when they are charged up to eighty pounds there is quite sufficient for one lecture.

Should any reader be of the opinion that the chlorine in the gas will have any injurious effect upon the metal of the cylinder, let him first ascertain the amount that is contained in such a quantity, and he will probably be surprised to find out that it is only a mere trace, quite incapable of doing any harm to metal if left in contact with it for a short time only.

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Subjects for Lantern Slides by the River.

By Peripatetic.

Perhaps no views have a more telling effect in a Metropolitan lantern show than those taken by the River Thames, especially of those portions made so well known to Londoners by the frequent trips from London Bridge to Hampton Court, or the still better known, from Putney to Mortlake and Kew.

The acquaintance the majority of Londoners have with the Thames is chiefly as passengers by the crowded steamers, or to witness some athletic contest, as the Oxford and Cambridge Boat Race, swimming matches, and such like, not one in a thousand giving a thought to the river banks and surrounding country, beautiful as they are, for their own sakes; they are simply looked on as a suitable and pleasant place for athleticism—may be, a nice way of going to a picnic to Hampton Court or Richmond Park, and that's all. The Thames from one end to the other abounds with pretty bits suitable for the camera and lantern slides. It is positively at one's own doors, and continually inviting us to make pictures of it before we go further afield; but, as the copy-books have it, "Familiarity breeds contempt." I will not go quite so far as this, but, undoubtedly, familiarity induces neglect, or we should have more pretty pictures of Thames scenery near London than we have. Richmond and Kew have always had a fair share of admirers, and numbers of camera men may be seen any fine day hard at work in these places; but the part of the Thames to which I will call special attention is not so far away as either Richmond or Kew, and may be reached in a score of different and convenient ways by omnibus or rail, and any photographer having an hour or two at his disposal, may find plenty of subjects on which he can exercise his ability, either for ordinary landscape, stereoscope, or snap shutter work.

It is, perhaps, impossible to truthfully say that any one part of the Thames near London is very much superior to any other for photographic purposes. It all depends on the kind of picture that is required. The photographer is, however, an airy individual, a lover of sunshine and flowery meads, and if he can get away for an outing, prefers the purer air of the country to the thick and smoky atmosphere of the docks and pool. Taking this predelection for granted, we will start from the ancient and well-known "village" of Putney, and see what we can find to make pictures of between it and Barnes, walking by the riverside. There are few of us that have not been disappointed on arriving at some places highly eulogised by another person as suitable for photography on finding them very different to what we expected. Either that person had no artistic instinct, or we fail to grasp the situation from the same point of view as he did, for the power to analyse a subject differs greatly with different individuals, and it is absolutely necessary that the photographer should be able to see in his mind's eye the picture as it will appear on his negative, print, or lantern slide. Unless he can do this, there is but little hope of his making a successful picture, unless by a fluke. But when the negative is taken and printed, the beauty or otherwise of the subject is at once seen and appreciated at its true value by those who beforehand could see nothing in the view itself.

This ability to see pictures is, perhaps, a natural gift, but one that can also be perfected to a certain degree by cultivation. However, those possessing a natural artistic perception are very much in advance of others who do not, and always succeed best in making artistic and pleasing photographs.

There is scarcely a yard of riverside but that under some conditions or other of light would make a good picture. There is, of course, no disputing but that accidents may provide surroundings better at one time than another as aids to picturesque effect in an otherwise uninteresting view. Now, with regard to the Thames side, these accidents of composition are frequently happening, and a little patience and selection will generally supply the necessary material for picture-making. Therefore, if the weather is suitable, the photographer may go with a light heart, knowing his trip will not be altogether in vain. When fortune is not propitious, and these accidental accessions seem to be few and far between, a little searching about will generally discover some flotsum or jetsom that may assist in the composition.

If the photographer cannot mentally realise his picture, it is simply useless attempting to do anything in the way of arrangement to better it. Natural arrangements are almost always better than artificial ones, however skilfully they may be managed, and nothing is more prejudicial to artistic effect than that set, out-of-place sort of look that is frequently seen in made up foregrounds. *Ars est celare artem* should be our rule.

After indulging in this little prelude, let us consider ourselves at Putney Bridge on the riverside path directing our steps westward. A view of the bridge with the old church is worth a plate. As to groups, boating parties and that sort of thing, there is considerable variety; but as they are of no special interest, we wait until one of the steamers or tug-boats in tow of barges gives rather more interest to the scene; then, with a quick shutter, we may secure some pretty effects. As we advance westward, we shall find a number of bits that are admirably adapted for lantern slides or stereoscope work. At Hammersmith Bridge there are several very attractive pictures to be made, with the old church in the background. Good views may be had from either end of the bridge, each of a distinct character. We now leave the south side of the water and go round to the other, passing by Biffin's Boathouse and over the Creek Bridge into the Mall. Several pretty pictures may be had here, quaint and interesting. On we go to Chiswick Eyot. At the landing-place there are generally barges with sails unloading into carts, &c., which form exceedingly picturesque combinations. Then we come to the Ferry below Chiswick Church, by Thornycroft's, where we cross the river again to the south side and on to Barnes. Just before reaching Barnes, if we are fortunate in finding a vessel moored to the posts at the beginning of the riverside walk, we are decidedly in luck if it happens to be a picturesque vessel and low tide, as the surroundings make an exceedingly pretty picture. Leaving the river, we turn to the left, through the village of Barnes, skirting the common and ponds, which will also provide a few pictures, and pass on to the old church—a building exceedingly picturesque, with a tower and sundial, which, I believe, dates from the eleventh century, and offers an exceedingly attractive subject for the photographer. This we may consider the last subject worth taking, if we do not include an omnibus which passes the Church, it will land you for the sum of twopence close to the Hammersmith Railway Station, and other 'busses to all parts of the Metropolis.

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Oils and Lamps for the Lantern.—No. IV.

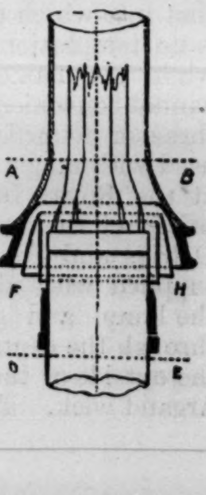
By W. H. Harrison.

The smell of those varieties of petroleum with which the public are best acquainted, is not attractive, yet some parts of the world yield petroleums described as possessing a pleasant odour; such varieties have reached this country from Burmah, India, Russia, Hanover, and from Italy. Should any of these be obtainable in the market, the facts suggest another way of getting rid of the unpleasant smell sometimes attendant even upon the skilled use of mineral oils in the lantern. That from Italy comes from Montecino, Piacenza, near Milan, from dug wells, some of them as much as 240 feet deep; it has scarcely any colour.

Among the conditions of contract which those who supply Trinity House with oils for burning in lighthouses have to comply are the following:—The mineral oil must be perfectly free from sulphuric acid; its flashing point is to be determined by means of the apparatus described in the Petroleum Act; if the oil be petroleum, its flashing point is to be not lower than 125° F., and it is to distil between 302° and 572° F., the temperature of the vapour, and not that of the liquid, being taken. If the oil be paraffin, its specific gravity is to be not less than 0·810 nor greater than 0·820 at 60° F.; its flashing point is not to be lower than 140° F., and it is to distil between 302° and 572° F.; the temperature of the vapour, not that of the liquid, being taken. The illuminating power of the oil supplied, whether petroleum or paraffin, is to be equal to that of the best colza oil, when consumed in a Trinity House Argand lamp.

Turning now to the subject of lamps, these are safer when they have no filling hole but that into which the burner screws, so that there is no temptation to supply oil to the reservoir while the flame is burning. This principle cannot conveniently be adopted with the present three or four flat-wick burners now ordinarily used with magic lanterns. Sir Frederick Abel, at the Royal Institution, spoke highly of the safety of the burners and lamps of Messrs. J. Defries and Sons. The centre of the wick is supplied with air which enters at the base of the lamp, and goes right up a pipe passing through the centre of the oil reservoir. Round the outside of the upper part of this pipe is the Argand wick. The wick is surrounded outside by another tube attached to the burner collar; this tube goes down nearly to the bottom of the oil reservoir, and as any explosive mixture of air and hydrocarbon vapour cannot form anywhere but at the top of the oil in the reservoir, the flame cannot get at it, even should a faulty wick enable it to travel a little down the wick tube. There is no opening between the top of the reservoir and the flame. In England flat-wick burners are most common; on the Continent round wick burners are chiefly used. One advantage of the latter for magic lantern purposes is that they lend themselves with advantage to the adaptation of a properly curved and placed reflector; they also facilitate the production of an intense light in a small space, which is a considerable advantage when considered in relation to the optical system of the lantern. Some paraffin lamps are fitted with appliances to increase the velocity of the supply of air to the flame. One way of doing this is to increase the draught by lengthening the chimney; another plan is to employ a revolving fan, driven at the base of the lamp by clockwork. A third plan is to introduce a jet of steam into the upper part of the chimney, and blowing off upwards. This plan, invented by Robert Lavender, has been used by Young's Paraffin Oil Co. for illuminating large open spaces.

The reason why, in this series of articles, the Trinity House burners have received so much attention is obvious, for when that powerful organisation has spent years of scientific work in determining how to get the greatest amount of light from paraffin into the smallest possible space, private individuals or public manufacturers are scarcely likely to be able readily to improve upon what has already been done at such cost. Therefore I here reproduce a drawing in section of the Trinity House two-ring paraffin burner, which drawing was given me by Sir James Douglass a few years ago. In this cut D E is the level of the oil, F H the bottom of the Douglass cones conveying air to different parts of the outer flame, and A B the focal plane or line of greatest illumination. The upper orifices of these cones especially have to be truly made and fixed at their proper levels. Their inventor explained, for instance, that if the inner cone were but slightly lowered so as to deliver air lower down upon the flame, the amount of light would be diminished. The flame represented in the cut is longer than necessary for lantern purposes, but on turning it down a little I could not see that the useful portion of it for the lantern was thereby diminished in brilliancy. A curious thing about these concentric flames is that they look streaky, for flame being itself transparent to light, the edges of each flame represented in the cut look brighter than the other portions, thus flames from a three-ring burner present six streaks from their six outer edges. When, however, it is remembered that the common three-wick burners now so much used in lanterns present to the condenser three bright streaks separated by spaces of darkness, yet ordinarily give so little unequal illumination of the screen that it rarely attracts the attention of unscientific observers, it follows that if we have six bright thin streaks in the same compass, with the spaces between them bright instead of dark, the Argand flames are an improvement in this respect upon those given by the burners at present in use. Keeping the oil at one level in the burner, thus giving the wick no more oil-raising work than is necessary, tends to theoretical perfection. This result is obtained in the burner now under notice by furnishing it with oil from a reservoir made on the bird-fountain principle. An advantage of such a system for the lantern would be that the oil reservoir would be entirely outside the lantern, and thereby kept cool. These burners are not manufactured by Trinity House, but are supplied to it by different contractors, who do not proffer them to the public for sale, or at least did not do so at the time of my inquiries, but who would sell them to anyone who gave them a special order. The names of the contractors can probably be ascertained by an inquiry sent to the chief engineer of Trinity House.



A three-ring Trinity House burner, as mentioned in my last, requires an exceptionally long and narrow chimney to draw sufficient air for the large amount of combustion going on. This chimney need not be entirely of glass, the upper part could probably be of metal, with a little asbestos packing between it and the top of the glass chimney it encloses. The asbestos packing should be just tight enough to prevent the entry of air with anything like freedom between the two tubes. This plan was suggested to me by Mr. F. H. Varley. The metal part of the chimney might be held if necessary by a support on the retort stand principle.

Unless the parts of burners like these were turned out by machinery to meet a special demand, their construction would be expensive.

Whether three-ring paraffin burners already exist in the market in Germany I know not, but it is possible, flat wicks being less used there than here. If the Germans already possess them, they will not be long in appearing here inside lanterns. With Argand flames, a properly made and placed reflector greatly increases the light without introducing disadvantages, except under conditions not likely to be practically encountered.

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The Magic Lantern as an Aid in Schools.

By Rev. T. Perkins.

(*Continued from page* 118.)

Smoking is less likely to occur when the chimney is made with a telescopic tube allowing it to be lengthened if necessary, and great cleanliness will prevent the unpleasant smell; no oil must be spilled on the outside of the cistern connected with the lamp, or, if by chance spilled, should be carefully wiped off, and before the lantern is put away, after the light has been put out, the oil that remains in the cistern should be poured back in the stock can, and the wicks again lighted, so that the little that remains in them may be burnt up; no charred wick must be allowed to remain on the wick-holders, and these should be carefully cleaned with an old tooth brush and a cloth before the lantern is put by. If these precautions are used, results sufficiently good for most purposes may be obtained from an oil lamp. It must be remembered that increased brightness may be obtained by decreasing the size of the picture, either by bringing the lantern nearer the screen, or by using a longer focussed lens.

Flatness of field is a great desideratum in a lens; by a lens that gives a flat field is meant one that will give good definition both in the centre and at the margins of the picture at the same time. This property is only met with in a high degree in the most expensive lenses, but some of the cheaper ones give a tolerably flat field, and the longer the focus the more likely we are to meet with it.

The lantern and other accessories having been procured, the next thing to provide will be the slides; slides illustrating nearly every conceivable subject are now on the market at the rate of about 12s. a dozen, but they can be made at a far less cost than this. Photographic slides, and these are undoubtedly the best, can be made for about 2d. each when the negative has once been obtained, and as it is much less costly to a make dozen slides from one negative than from twelve different negatives, as when once the correct exposure for a certain negative has been obtained by trial it is easy to make certain of successful results one after another; it would be well if a system of exchange were organised between different schools; and before long probably some such scheme will be carried out.

Some kinds of slides, such as maps, diagrams, tables, &c., may be made by tracing, drawing or writing what is desired with a fine pointed black lead pencil upon a piece of finely ground glass, and then pouring on it a solution of Canada balsam in benzine, which will almost entirely obliterate the grain and render the glass transparent. The glass may then be finished as usual with a "cover glass."

Some diagrams, such as pendulum curves, may be traced out by the moving point, scraping off the deposit of carbon on a shell of smoked glass, and this may be used as a negative from which a transparency can be made photographically by reduction.

Transparencies made from good photographic negatives will form the majority of the lantern slides used, and masters of a school who often go for a tour during their summer holidays will, if they have taken up the fascinating pursuit of photography, find many opportunities of adding to the stock of lantern slides belonging to their school. Some of the boys may be induced to take up the same work, or at any rate will gladly devote part of their time on wet days, when out-door games cannot be played, to making lantern slides from their master's negatives, and it has been found that this common pursuit has often drawn masters and boys into closer and more friendly relations to each other; and in some cases, too, the boys have found the knowledge of photography thus acquired in a pleasant way of use to them in after life.

Leaving this part of the subject, it may be well to indicate some of the uses to which the lantern may be put in brightening school lessons, and rendering the teaching more interesting and effective. Lantern slides may in many cases be used instead of costly diagrams; a small map or engraving may be copied by means of the camera, and from this the lantern slide made. This method will be of great advantage when the lecturer wishes to describe machinery, or methods of manufacture, or other branches of industry. Suppose, for instance, the subject of the lecture was coal mining, a map would probably be needed first of all to show the distribution of the British coalfields, such a map would be found in any treatise on the subject; then plans of the workings and sections showing the shafts and methods of ventilation. All these could easily be copied from diagrams in books, or the master might draw them in chalk on the black-board, or in charcoal on paper, and photograph them. If chalk and a black-board were used, the chalk being employed to represent chalk lines, the "negative" made from it might be used as the lantern slide. Transparencies made from negatives taken at one of the collieries would show the method of working above ground, and groups of the men and women employed would complete the series and give the students a more accurate idea of the work than any mere description would do.

In teaching geography again, the lantern may be profitably employed. This study, it has always been held, should begin with the topography of the district, with which the boys are familiar. A six-inch-to-the-mile ordnance map in which the roads, fields and ponds, which the boys see everyday as they come to school will give them an idea of how surface features are marked on maps; and when their knowledge is extended, instead of merely pointing out on the map of England, for instance, this or that headland, this or that lake, we should also show them lantern slides taken on the spot, then they would get to know not only that Flamborough Head is in Yorkshire, Land's End in Cornwall, Selsey Bill in Sussex, but they would have impressed on them that the first is a bold mass of chalk, that the second composed of weathered blocks of granite, and that the third is a low spit of sand and gravel. Again, how difficult those chapters in geography are which attempt to describe the vegetation of foreign lands, where the trees belong to orders different from those that the boys, who have rarely travelled beyond the limits of their native land, or perhaps native county, have seen. The animals that live in the sandy wastes of Western Asia, or amid the frozen snows of Arctic regions, or in the tropical forests of South America, may have been seen by the boys at the travelling menagerie or at the "Zoo," when last they were in London, but the youthful mind is often forgetful, and the lantern pictures of the animals will refresh their memory.

A lantern picture from its very size is far more likely to give a true idea than a picture in a book which must of necessity be small. Views of Swiss glaciers, Norwegian fiords, and Indian jungles, will teach the pupils much about the various characters of natural scenery, and views of foreign cities will give them some idea of the architecture and of the manners and costumes, and the mode of life of the inhabitants.

History is a most interesting subject when properly taught, but the treatment it receives at the hands of teachers often leaves much to be desired. A few pages of a text-book are set as a lesson and the boys are questioned on them, and are expected to give dates, genealogies, the names of commanders, the results of battles, and the fate of bills in Parliament; mere facts that will in many cases be forgotten before a week has passed. What would make history more interesting would be to make it life-like, either by taking the class to the spot where the great events have taken place, or, failing this, by bringing accurate representations of the places by means of pictures before the class. The story of the signing of the Magna Charta would be made more lifelike by a picture of the mead by the Thames where John met the Barons; the death of Becket by one of the spot, in the cathedral where he fell, done to death by coward knights; a picture of the Hoe, when Drake and Hawkins played bowls, and from which they saw "the gallant merchant ship full sail for Plymouth bay" running in with the tidings that the seven-mile long crescent of Spanish men of war had been sighted, would make the story more full of life; views of the Tower would lend an interest to the tale of many an unfortunate hero or heroine of history; one of Kenilworth Castle would bring vividly before the eyes of the class the greatness and meanness of "the spacious times of great Elizabeth." Pictures of the noble buildings raised in mediæval days would correct the mistaken views that boys are apt to get of the darkness and ignorance of those days; phototographs of the tombs of the great men who have won renown in battle-field or council hall, or of those who have left their names as blots upon the roll of fame, on many of which tombs their sculptured forms recline, will give some idea of what those men in outward semblance were. Again, how much of history fails to be understood by boys because they have no idea of the buildings in which the men of former times lived? Drawbridge, moat, portcullis, machicolations, and other terms connected with the castle of the middle ages, are words and nothing more; but a visit to a well-preserved castle or a photograph shown on the lantern screen will soon put the matter right. Boys have frequently been found in inland schools utterly unable to realise the details of the death of Nelson from ignorance of the character and rigging of a battle ship; most of this difficulty would be dispelled by the sight of a lantern slide of the *Victory* as she lies in Portsmouth harbour.

In teaching geology, also, the lantern will be found a most valuable accessory. The principles may be learnt from text-books, hand specimens will give a true idea of the character and composition of the rocks, but straitigraphical geology can alone be learnt in the field, or by means of some accurate pictorial representation. The diagrams and wood-cuts in text-books are often very poor, and are often fancy sketches, not pictures of actual rock formations. Nothing but a photograph taken under suitable lighting will give an absolutely correct rendering of nature for this purpose. Scratched rocks, perched blocks, moraines, contorted statification, and embedded fossils, may by lantern slides be brought face to face with the boys in the class-room. A series of pictures of the same place taken at intervals of time may exhibit changes due to the various agencies that modify the face of the earth, and so the processes of nature may almost be seen at work.

These few subjects have been chosen in order to illustrate some of the ways in which the lantern may be used in class instruction, but there are a few subjects taught in schools—pure mathematics, perhaps, excepted—which may not be illustrated and rendered easier for the minds of boys to grasp by a judicious use of this valuable instrument.

—:o:—

The Relative Power of Illuminants for the Lantern.

By C. Goodwin Norton.

If a lanternist were asked the relative powers of the light produced by a 4-wick lamp, a safety jet, mixed jet or the ethoxyen system he would most likely refresh his memory by consulting a text book or the "Optical Lantern Catalogue" of Luminous & Co., or some other well-known maker, which would probably tell him that they would be respectively: 4-wick lamp, 60 candles; safety jet, 200 candles; mixed jet, 427 candles; ether light, 420 candles. Or if he were of a practical turn of mind he would proceed to test the light himself, which is done thus: Set up a stick about three feet from a white surface and project a shadow of it from one of the lights to be compared, which should be placed as far back as possible. A candle of standard power is made from sperm wax, and weighs six to the pound; it also has a wick of certain definite size which always gives the same amount of light. A candle of this description is lighted and placed between the stick and the light, moved nearer or farther away until the density of the two shadows is exactly equal. Now measure the distances between each light and the stick; square them; divide one by the other and you have the relative candle power. Thus, distance between stick and candle, 18 inches; distance between stick and light, 12 feet; $\frac{12 \times 12}{1\frac{1}{2} \times 1\frac{1}{2}} = 64$, the candle power of the light; or again, distance between stick and candle, 5 inches; distance between stick and light, 20 feet $\frac{20 \times 20}{\frac{5}{12} \times \frac{5}{12}} = \frac{\frac{400}{1}}{\frac{25}{144}} = \frac{400 \times 144}{25} = 1304$ candle power required.

This method of estimating the power of light is considered to be sufficiently accurate for all practical purposes, in fact, the gas we use in our houses is daily tested by government officials on this principle and the companies are occasionally fined for failing to maintain the proper standard, the limit of variation allowed being exceedingly small. But in comparing the light for lantern work the use of lenses is pre-supposed, and this is where the above test fails, or rather is liable to mislead, the size of the light having to be taken into consideration and also the distance it can be taken from the condenser. For example, an electric lamp of two candle power can be made to project as much light on a screen as a four-wick lamp does, reckoning the latter as 64 candle power. The condenser, three inches in diameter, in the former case is of half-inch focus, and in the latter, three-inches in focus; the light being proved to be equal by the fact that a bromide enlargement requires the same exposure in each case, some allowance being made for the yellowness of the flame of the oil lamp. This is not a suppositious case, the condensers of ½-in. focus being in actual and constant use.

A condenser is only able to collect the rays coming within a small area, which varies according to its length of focus. All the light outside this area is wasted and is worse than useless, as the heat which accompanies it is a serious inconvenience.

Take the case of an oil lamp and short focus objective and condenser. It will be found that there is considerable latitude in which the light can be moved either from side to side, or higher and lower without the disc on the screen being effected to any great extent, but if the objective and condenser are of long focus the light on the screen is considerably less than it was, but the lamp may still be moved considerably without affecting it.

Now let a mixed jet take the place of the oil lamp, and it will be found that at the slightest movement a dark shadow appears on the screen. If the short focus lenses are substituted for the long ones there is little or no gain in light on the screen with these as there was with the oil lamp. If these experiments are made with a blow-through jet and a mixed one the deductions would be the same, but the differences would be less in proportion.

From the foregoing it may be gathered that the real value of the mixed jet is most apparent when pictures are to be shown at a long distance, the area of its light being small. For shorter distances the blow-through answers as well—or nearly as well—as the mixed, because the whole of it can be used, which is not the case when the long focus lenses are employed.

The colour of the light from a safety jet is not so good as that of the mixed, being yellowish, but this defect can be remedied to a great extent by a careful adjustment of the two gasses and use of a lime shield. It is absurd to describe any oil lamp as being equal to the limelight. In one sense it produces nearly as much light, but the area of illumination being large a great deal of it never reaches the screen, as the focus of the lens cannot be much shorter than 3 inches on account of the heat. The management of an oil lamp is far more troublesome and disagreeable than that of a safety jet with oxygen supplied from a cylinder, and is not nearly so free from danger.

—:o:—

Speaking in Public.

(STUTTERING AND ITS CURE.)

By Alexander Brown.

Many persons who can speak in private in a fluent manner find great difficulty in so doing before an audience; even although the subject upon which the person is discoursing be one with which he is quite familiar. The majority of such individuals are self-conscious, and it is only a question of time and practice for them to gain a mastery over themselves. A ready means of so doing is to impress upon oneself that he is speaking, as it were, to one member only of the audience, and that member at the far end of the hall; endeavouring for a time to try and ignore the presence of the other individuals.

There is, however, a more inconvenient phase of hesitancy which arises from a totally different cause, and this phase is known as stuttering.

Let us for a moment consider the action by which stuttering is brought about:—At the end of the windpipe, near the tongue, is a narrow opening called the glottis; now, in order to utter or articulate sounds this glottis must be open; but from a variety of causes, upon which I need not enter, the glottis will at times spasmodically close, and the speaker seems to lose control over his vocal organs, hence what is termed stuttering ensues. It then becomes necessary that the speaker must resort to methods which will open the glottis without having to wait for the spasm to subside, so as to avoid that straining, puffing and blowing which generally takes place at this time.

When speech has continuity, as in singing or reciting, the glottis very rarely closes spasmodically, and in order to effect a cure when speaking, it is necessary that a continuity be formed in the words.

It is at words commencing with a consonant that this unpleasant closure invariably takes place, and the greater the effort to get the particular word out, the tighter the closure for a time.

Those who experience this difficulty, should endeavour not to let their thoughts run far in advance of their words, to take deep inspirations of breath, and to endeavour to inhale air at the termination of a sentence only, also to take plenty of time before commencing to speak, and not to hurry out as many words as possible in a given time, thinking that by a continued rush of words that the spasmodic closure will be prevented. Better speak slowly, for the fear of stuttering will invariably bring on an attack.

To show that the state of the mind has a great influence on the speaker who is given to stuttering, let him impress upon himself that everyone present knows that he will stutter at intervals and that they expect to hear it; he, then, knowing that it is expected, will unconsciously avoid it, even much to his own surprise; but if the spasms do occur, he should refrain from trying to force the word out and merely say—"eh,"—a sound over which no one can stutter and which will immediatly cause the glottis to open, after which he can again proceed.

If, as soon as there is any difficulty in getting out a word, this sound eh be used, a continuity will be maintained which will merely appear as a slight drawl. However, the speaker, knowing that he is in possession of the magic key, eh, which will open the glottis, will soon be so impressed with the fact that he has gained a mastery over his glottis, that he will be enabled to speak with a degree of comfort and fluency not before experienced by him, and in due course no further trouble will be experienced in this direction.

Correspondence.

LANTERN MATTERS IN AUSTRALIA.

[*To the Editor.*]

DEAR SIR,—As a subscriber to your valuable little Journal since the beginning of the second Volume I wish to add my quota to the many words of praise you are daily receiving in its favour, and to acknowledge the great benefits I have received from a careful perusal of its pages. It is a pleasure to bring it under the notice of Lanternists with whom I come in contact. After reading all that I could come across in books and in your pages on the subject of Saturators, I decided to try the æther light, as being the most convenient and as requiring less apparatus than the other forms of limelight. I purchased one of Scott's "Warm Air Saturators" and found it extremely good for single lanterns, but not much use for dissolving. I succeeded in dissolving with it at one entertainment for an hour and a half, and had put through the whole of the slides in the lecture, except five, when I had the "pops" about which so much has been written in your Journal. I must say they were startling enough both to myself and the audience, they being the first I had had up to that time. The oxygen supply was promptly cut off--the gas in the Hall relighted—the audience being quickly reassured as to the absence of danger, but they had had enough for that evening.

I agree with many of your correspondents that even "pops" would be a great source of danger with a crowded audience, but I believe it possible to use the Saturator for dissolving and not have the "pops," as I am of opinion that I could *now* use it under the same conditions as on that evening and not have the "pops," for this reason : When dissolving, a short time previous to the pops, the lime in the "off" lantern continues incandescent with the gas from the Bye Pass, and I had to put the brass shutter in front of the objective to shut off the picture in the "off" lantern. I now know that when these conditions commenced the gas was getting dangerous, and that I should have shut off one of the lanterns and continued the exhibition with a single one, and by this means I would have avoided the pop. I believe the warm air Saturator perfectly safe and reliable with a single lantern.

Previous to commencing its use I never had any experience of the limelight in any form, but by following the directions given, I found no difficulty in working it, even on the first time I tried it. I have never had a pop when using it with a single lantern. I had the small size (2½ hours) one, but fancy that with the larger one it would be possible to dissolve for a two hours exhibition without any danger of "pops," as to my mind the small size does not contain sufficient æther to thoroughly saturate the gas passing through it during a two hours exhibition, my principal reason for this being that I am now using a four barrel Saturator made in the colony and I have never had the slightest approach to a pop, though I have used it for dissolving with a biunal over a dozen times and I know the maker has used one of the same kind for over two years, using it two or three times a week, without having a pop. It contains, when fully charged, about 2 lbs. æther. The gas going through the four barrels, each being about twelve inches long, gets thoroughly saturated with vapour, which I believe to be the reason of its working so well. This climate being so hot, is very trying on gas bags, and having had one burst during an exhibition and let all my gas out (fortunately I had my oil lamp in readiness and was able in a few minutes to go on with the exhibition), I tried a portable gasometer made by the maker of the four barrel Saturator on the principle of one in Chadwick's book on the lantern, which I found reliable and a great saving in potash. The gasometer is practically the same as in Chadwick's book, and is a square one, the principal difference being in the apparatus for generating the gas. In the tank I have three retorts made of sheet iron (each holding ½ lb, of Pot. Chlor. Cryst. and ½ oz. Manganese), which are coupled to a piece of brass tubing that is connected to the inlet of the tank with a length of rubber tubing.

Previous to the entertainment a retort of gas is made ready for use, the spent retort is disconnected and another, ready charged, put in its place. You have now got the tank full of gas, and three retorts connected together ready for making ; all that requires to be done being to light a spirit stove and place it under the first retort (when the gas in the tank is nearly exhausted), and in two or three minutes the gas will begin to come off, and very soon your tank will be full again when you blow out the spirit stove and place it under the next retort ready for relighting when you require more gas.

This apparatus is extremely convenient to use, and in countries where cylinders of oxygen are not easily obtainable, the most satisfactory that I have read about or seen; and for climates like this country or India a very long way superior to bags.

The lantern is not used so largely here as it might or should be, and as a form of entertainment is looked down upon, chiefly through the inferior quality or class of entertainment given by many of the travelling lanternists of days gone by. Things are better, however, than they were five or ten years ago, the class of entertainment is very much better and the light better also. One of the great difficulties in the way of getting better slides and apparatus, is that we have to pay a duty of fifteen per cent. on lanterns, apparatus and slides, which is a heavy handicap, especially in the matter of getting fresh slides.

I am going to try and start an amateur lanternist association in the colony, principally for the interchange of slides. Most lanternists have different sets, and by having an association of members and keeping a list of the slides which each have, and which he would be prepared to hire to other members of the association at a small charge for, say, one or two months, by this means each member would be able to get fresh sets at a nominal rate, instead of using the same few sets over and over again, as at present. This, I believe, would be the means of greatly popularising the lantern here. I might say that I inquired the rate of the hire of a set of slides for *one* night from the only business firm in Queensland that carries a stock for hire, and they wanted 27s. for the hire of a set of fifty coloured slides for one night, which, you will readily see, was beyond the pockets of most lanternists for hiring, hence the effort to start the above association.

I remain, dear sir, yours truly,

Queensland. W. J. McCULLOCK.

THE INVENTION OF THE DISSOLVING VIEWS.

[*To the Editor.*]

SIR,—Replying to the various correspondents who have honoured me by noticing my letter in your issue of May last, they will find my answer contained herein. The evidence I submit for their and your readers' consideration they will be able to verify for themselves.

I would point out to Mr. Wilkie that it was not I that questioned who did the paintings for the late Polytechnic. I merely hinted that special artists were employed to execute the designs, and he has since acknowledged that I was correct. I can perfectly understand his distaste for dates, but I, being enly a "nebulus hypothesis," am perforce obliged to employ the same. To be brief, Mr. Wilkie and Mr. Hill, in April, May, and June numbers, claim that the latter gentleman, in 1846, in conjunction with Mr. Childe, did invent the dissolving fan used in front of the objectives, and that before that date there was no such thing as dissolving, as we now understand it. In support of this statement they give two dates—one 1846, mentioned above; and the other 1832, when Mr. Hill informs us "he was very much about." As this is rather vague, it would be interesting to your readers to know what age this phrase expresses.

There is no doubt Mr. Wood is well-informed in the matter, and he is corroborated by the "Encyclopædia Britannica, ninth edition, page 213, which states: "Dissolving views were invented by Childe, who employed two lanterns side by side, with tin fan in front for dissolving. First exhibited in 1811." Mr. Kerr, of 31, Fulham Park Gardens, S.W., a contemporary of Mr. Childe, says: "Mr. Guy, at Vauxhall Gardens, in 1840, was using two lanterns side by side, with the dissolving fan in front of the objectives. Also at the Adelaide Gallery' in 1842, the same kind of apparatus was in use." The *Magazine of Science* for 1843 gives a description, with illustration, of the lanterns then in use at the Polytechnic Institution, showing the fan in front of the objectives. This book I have in my possession, and, acting on the advice of Mr. Harrison, I have pleasure in forwarding the same, together with play-bills referred to in my first letter, under separate cover, if you will kindly take charge of them for a fortnight, that any of your readers that are interested may inspect them.

I am, sir, yours obediently,
SUUM CUIQUE.

[On page 129 we reproduce the sketch of the lantern mentioned above, and shall have pleasure in showing to anyone interested the play-bills alluded to, of 1832, 1836, and 1839. These will be on view for a fortnight.—Ed.]

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Notes and Queries.

G. Bovine.—Try rubbing a little blacklead at the parts of the carrier where there is friction; if this does not answer use sandpaper and afterwards blacklead.

B.J. asks how he can cut circles, oval, and cushion shapes from paper, on a small scale, for making mats for lantern slides? *Reply.*—Procure shapes of the desired sizes, consisting of a plate of brass from which the centre has been cut out, place the paper on a sheet of glass, then the shape upon this, and with one sweep of a wheel cutter cut the piece out. Some time ago Messrs. Thomas & Co., of Pall Mall, were agents for a shape by means of which several different sizes could be cut out. You will find particulars of this article in this journal for August, 1890, and also a full-sized sketch of same.

Ignorant asks: "If I obtain a large diameter lens will it give me a larger picture than one of smaller diameter?" *Answer.*—The diameter of the lens has nothing to do with the size of the picture projected. If two lenses of the same focus, but of different diameters, were used they would produce images of exactly the same size; but (according to the relative sizes) more light would pass with the larger diameter, consequently the picture projected by it would be brighter than the other, but both pictures would be the same size.

M.—You can obtain the copy of the Patent Specification for 8d.

S. Winch.—We make no charge for answering queries, but we like correspondents to send them as early before the 24th of the month as possible.

Contact Printer writes:—"When making contact slides, which is the better plan, a strong light and short exposure, or a somewhat subdued light and a longer exposure? *Answer.*—The latter.

A.G.B.—You will find much of the information you enquire about if you obtain the annual report of the Y.M.C.A. You can get it at Exeter Hall, Strand, W.C., for one shilling. With regard to your other query, the usual method is to select your route and send an advance agent ahead to make all arrangements, post bills, and noise the affair abroad generally.

Edmund Stirling.—Thanks for letter.

Amateur.—(1) Draw any geometrical design and make it in duplicate upon glass, colour both precisely the same, insert them in the frame face to face. (2) The glasses are kept in position in the frame by "jump rings." (3) You can obtain suitable colours from Bernard & Son, of Berner's Street, W.

Geo. Kelly asks if it is possible to tint lantern photographic slides by "dabbing" only, and without the application of a brush. *Answer.*—We have seen some very pleasing effects tinted in the manner you mention.

Jet.—The jet is evidently an old one, although it may to all appearances be new. The connection of the lime pin, and the rod for turning the lime, is a spiral spring, this; style is, we believe, not now made, as the spring had an awkward habit of getting a set so that if the lime were *slightly* turned it would jump back again to the original position.

H.T.—If used with bottles, quite as safe; and if in experienced hands, the light obtainable is as good, but we will not say better, than the form you mention.

T. McAllister.—(1) No lantern dealer has yet taken this matter up. You might perhaps be able to obtain one by writing to Trinity House Workshops (near you). (2) See sketch in this issue.

Jas. Hardy.—The double reflection in the mirror you speak of is caused by one from the front and the other from the back surface of the glass.

Withers, junr.—We are quite unable to follow your meaning, you write as if we understood all about what you were trying to do. You simply say, "I intend fitting a spiral spring on a portion of my lantern; if you can tell me the best method to keep it in place, I shall be obliged." If you say where it is to be and how you want it to act, we may perhaps be able to aid you.

W.S.—(1) The Continental firm may be all right, but sometimes there is great difficulty in suing for payment. (2) We do not know the size of the largest sheet of tracing paper obtainable. Can any of our readers inform us?

Operator writes: "My sight has of late been getting very defective, and when manipulating the lantern I am compelled to use spectacles; these enable me to attend to everything round about me, but I am a little uncertain about getting the picture sharply focussed on the screen. Can you suggest anything, for I am afraid of losing my appointment as operator at ———." *Answer.*—Keep a pair of opera glasses lying beside the lantern and use them as occasion arises.

A. Donelly,—Your pictures are under-exposed and over-developed.

J Rumsey.—We made a slight alteration in your copy, which replies to your question.